Title: Algorithmic applications of finite Markov chains

Author: Petra Pavlačková

Department: Department of Probability and Mathematical Statistics

Supervisor: RNDr. Michaela Prokešová, Ph.D.

Supervisor's e-mail address: prokesov@karlin.mff.cuni.cz

In the present work we study MCMC algorithms, that we use for simulating from probability distributions on finite set of states. We apply these algorithms to two models: hard-core model and q-coloring of a graph. In this work we use the theory of stochastic processes, mainly of Markov chains and their properties. Furhter we analyze some problems, which may occur during the simulation, particularly we focus on convergence of the marginal distribution of the Markov chain to the stationary distribution. The last part of the work is a numeric illustration of the Gibbs sampler which we use in order to estimate the mean value of the number of 1 in a generalized hard-core model.

Keywords: Markov chain, MCMC algorithm, hard-core model, speed of convergence